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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/676,796	10/01/2003	Joseph Broun Powell	TH1778 02 (US)	8364

7590 08/25/2004  
Donald F. Haas  
Shell Oil Company  
Legal-Intellectual Property  
P. O. Box 2463  
Houston, TX 77252-2463

EXAMINER

PRICE, ELVIS O

ART UNIT	PAPER NUMBER
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1621

DATE MAILED: 08/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary****Application No.**

10/676,796

**Applicant(s)**

POWELL ET AL.

**Examiner**

Elvis O. Price

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-7 and 9-12 is/are rejected.
- 7) ☒ Claim(s) 2 and 8 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 10/1/03.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

### DETAILED ACTION

Claims 1-12 are pending in the application.

#### ***Priority***

Applicants' claim for domestic priority under 35 U.S.C. 119(e) is acknowledged.

#### ***Information Disclosure Statement***

The information disclosure statement complies with the provisions of 37 CFR 1.97, 1.98 and MPEP02 § 609. It has been placed in the application file, and the information referred to therein has been considered as to the merits.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 3-7 and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sunkara et al. {US Pat. 6,235,948}, in view of Haas et al. {US Pat. 6,297,408}.

Applicants claim, in brief, a process for producing 1,3-propanediol comprising the steps of: a) forming an aqueous solution of 3-hydroxypropanal, b) hydrogenating the 3-hydroxypropanal to form a first crude 1,3-propanediol mixture comprising 1,3-propanediol, water, and MW 132 cyclic acetal, c) distilling the first crude 1,3-propanediol mixture to remove water and low boiling impurities and form a second crude 1,3-propanediol mixture, d) contacting the second crude 1,3-propanediol mixture with an acid form cationic exchange resin at a temperature of from about 50 to about 150° C to convert the MW 132 cyclic acetal to more volatile cyclic acetals and/or other degradation products, and e) separating the more volatile cyclic acetals and/or other degradation products from the 1,3-propanediol by distillation or gas stripping.

Sunkara et al. teach a process for producing a purified 1,3-propanediol, wherein a crude 1,3-propanediol product (containing water and impurities) may be prepared by hydrogenation of 3-hydroxypropanal, comprising removing water by distillation before contacting the second crude 1,3-propanediol mixture with an acid form cationic exchange resin (Nafion), followed by separation of the desired purified 1,3-propanediol from formed colored or uncolored impurities (degradation products) (see Summary of the Invention; Col. 2, lines 6-32; Col. 3, lines 30-44 and Example 1). Sunkara et al. teach that the second crude 1,3-propanediol can be contacted with the resin at temperatures ranging from 100 to 160 C for 0.1 to 3 hours and other suitable heterogeneous acid catalysts (used for contacting the second crude 1,3-propanediol) are, inter-alia, acid zeolites (see Col. 2, lines 33-67 through Col. 3, lines 1-3). The difference between the presently claimed invention and what the Sunkara et al.

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reference teaches is that Sunkara et al. are silent about a MW 132 cyclic acetal component, if at all present.

Haas et al. teach a process for producing 1,3-propanediol comprising, hydrogenating aqueous 3-hydroxypropanal to form a crude 1,3-propanediol mixture comprising 1,3-propanediol, water, and MW 132 cyclic acetal (2-(2'-hydroxyethyl)-1,3-dioxane, HED) before drying the crude 1,3-propanediol (see Col. 2, lines 9-24; Col. 8, lines 61-67 through Col. 9, lines 1-15).

It would have been *prima facie* obvious to one having ordinary skill in the art, in view of the teachings of the Sunkara et al. and Haas et al. references, to arrive at the presently claimed invention because Sunkara et al. teach a similar process for producing a purified 1,3-propanediol, wherein a crude 1,3-propanediol product (containing water and impurities) may be prepared by hydrogenation of 3-hydroxypropanal, comprising removing water by distillation before contacting the second crude 1,3-propanediol mixture with a heterogeneous acid catalyst such as Nafion or acid zeolites, followed by separation of the desired purified 1,3-propanediol from formed colored or uncolored impurities (degradation products) and Haas et al. teach process for producing 1,3-propanediol comprising, hydrogenating aqueous 3-hydroxypropanal to form a crude 1,3-propanediol mixture which contains, inter-alia, a MW 132 cyclic acetal (2-(2'-hydroxyethyl)-1,3-dioxane).

One having ordinary skill in the art, desiring to arrive at other alternative methods for producing 1,3-propandiol, would have been motivated to integrate the 1,3-propanediol manufacturing process, taught by Haas et al., into the 1,3-propanediol

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purification process taught by Sunkara et al. One having ordinary skill in the art would have been motivated to do so because the Haas et al. process for preparing 1,3-propanediol is recognized in the art as a process for obtaining high conversion of the 3-hydroxypropanal intermediate and high selectivity to the desired 1,3-propanediol and the Sunkara et al. process is recognized as a process that generates polymer grade 1,3-propanediol which can be used to prepare polymers with excellent color characteristics. Therefore the presently claimed invention would have been obvious to one having ordinary skill in the art.

***Allowable Subject Matter***

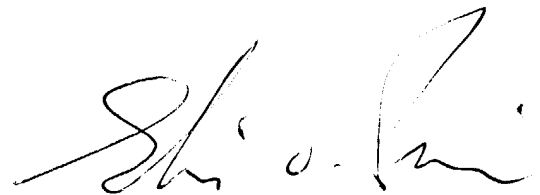
Claims 2 and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The subject matter of claims 2 and 8 are unobvious over the prior art of record because the closest prior art of record (US Pat. 6,235,948) teaches away from distilling the second crude 1,3-propanediol while the 1,3-propanediol is being contacted with the heterogeneous acid catalyst.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elvis O. Price whose telephone number is 571 272-0644. The examiner can normally be reached on 8:30 am to 5:00 pm; Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann R. Richter can be reached on 571 272-0646. The fax phone numbers for the organization where this application or proceeding is assigned is 703 872-9306.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-1235.



Elvis O. Price

August 19, 2004